September 25, 1956

Project 2035





(TNCAMERE)

Subject: Portable Typing Device

Gentlemen:

We have carefully studied the subject equipment and circuits. Accordingly we propose a development on a CPFF basis in three phases, each phase to be approved before going into the next.

Phase I would be a study phase in which faults in the present equipment would be studied and remedies recommended, possibly without basic redesign. Additionally the ideas suggested in the attached memo for an improved equipment would be investigated along with any added ideas resulting from further study. It is possible that the immediate incorporation of the new ideas into a new model would solve your problems as quickly and better than correction of faults in the old design. We estimate that this study phase would take a month and would cost $3903. and we are enclosing cost estimate for this phase. The report and recommendations would be discussed and mutual decision made as to the conduct of Phase II.

The second phase would involve design, confirmation by breadboards of various sections of the equipment and construction of an engineering model. It is estimated that this could be accomplished in six months at a cost of between $20,000. and $30,000. It might be possible to simultaneously correct or modify a few models of the old equipment within this period depending on the extent of the faults and corrective measures.

The third phase would be a repackaging phase in which any deficiencies in the engineering model resulting from the second phase would be corrected and improvements made. The cost is estimated at $20,000. and the time at five months. If desired, additional equipments could be made by us in quantity cost.

We would be prepared to undertake this development shortly after receipt of order. Two copies of our brochure are enclosed, the one containing pertinent financial information.

CONFIDENTIAL

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Senior engineers who would be involved in this work are [redacted] 50X1
[redacted]. Among Junior engineers will be [redacted] 50X1
[redacted] and among technicians, [redacted]. A 50X1
specific experience of several years in teletypewriter work by Mr. [redacted] has brought forth the important keyboard ideas mentioned 50X1
in the attached. The program would be under the supervision of Mr. [redacted] 50X1

We will be happy to answer any questions.

Sincerely yours,

[redacted] 50X1

Vice President

LT:gs

Encs.
Orig. & 2 cc Memo
2 brochures

# ANALYSIS AND PROPOSED IMPROVEMENTS in PORTABLE TYPING DEVICE



## GENERAL

The magnetic recording medium registers key depressions in terms of a Baud code. A starting "space" is recorded ahead of the code sequence and the playback generates coded pulse sequences so that the amplified output is suited for actuating a teletype-writer.

The basic elements of the process are:-

1. The keyboard, its switching and the storage system.
2. The commutation system for making possible the recording with one head instead of five.
3. The drive motor, single revolution clutch and tape transport system.
4. The recording medium and its recording.
5. The playback head, the pulse shaping system and the pulse output.
6. Facilities for operation on different power supplies.

## 1. ANALYSIS OF KEYBOARD

When a key is depressed fully and starts to spring back, an associated switch actuates the single revolution clutch which advances the tape 1/2 inch. Simultaneously the commutator starts to turn. As the key springs back, its corresponding code sequence

has been registered in a capacity storage system by a particular set of five switches associated with its return stroke. The commutator "finds" the code sequence set up by the capacity storage. The resulting DC pulses are electronically operated on and then applied to the recording head.

This results in a rather complicated set of switches, all different, in the keyboard. This calls for a relatively large space requirement and possible switching problems in service.

An optional keyboard is proposed making use of a standard teletypewriter principle and described in Figure 1. This eliminates the capacity storage because the "storage" is set up mechanically. This opens the way for use of AC recording with major advantages in playback simplification. This keyboard is much simpler than the present one, provides interlock, and can be made much more compact, as indicated in the sketch.

2. COMMUTATION

The output of the above-described keyboard could be applied to the same type of commutator as now used.

It is proposed that, instead of recording DC pulses, a frequency of the order of 1000-2000 cycles be used. An oscillator would provide this and the switching and commutator would provide the coding.

3. MOTIVE MECHANISM

If a drive motor of fast enough start (requirements do not appear too severe) can be incorporated, the single revolution clutch can be eliminated. The tape transport seems generally satisfactory. A very low power DC motor could probably be used and

introduces the possibility either of conversion to different power supplies by rectifiers and resistances or of a battery powered device.

4. RECORDING

The recording anticipated would be bursts of 1000-2000 cycles, (which is in the range where the recording qualities of magnetic tape are at a maximum). The recording would not occur during starting or stopping sections of the sequences, such sections being kept short by fast start and stop. In typing, it takes a typist (typewriter company research) a minimum of .12 seconds between key strokes from fingers of the same hand. Calculations indicate that fairly good typing speed could be used, that the speeds during the recorded code sequences can be adequate for incorporating a number of cycles in each hand and that overall spaces for each code sequence can be less than 1/2 inch per sequence now used if desired.

5. PLAYBACK

With AC recording the need for the complicated pulse handling circuitry could be dispensed with in favor of a simple amplifier terminating in a rectifier to provide DC output pulses to the teletypewriter. This points to transistorization and battery operation.

6. POWER SUPPLY

Presently the transformer and the power supply introduces considerable bulk and weight. A small DC motor and transistorized electronics appear very practical for eliminating power supply problems, greater compactness and lighter weight. Small rechargeable batteries are a good possibility and inbuilt recharge facilities could be considered. At any rate a small DC motor, operatable

through rectifiers and resistors offers an improved adaptability to different power supplies.

CONCLUSION

Unless there are faults in the above reasoning, the proposed improvements could be incorporated into a system to provide the following advantages.

1. A simpler, more compact and stable keyboard (generally based on known teletypewriter principles).
2. Elimination of the capacity storage (but addition of a simple AC oscillator).
3. Possible elimination of the single revolution clutch in favor of fast start motor. (Motor might be DC for improved adaptability to the various power conditions, or might be battery-operated).
4. Much simplified electronics without need for pulse handling circuits.
5. A more compact and more reliable equipment.
6. Strong possibility of a simple, long life, transistorized battery - operation with large elements like power transformer unnecessary.

September 25, 1956

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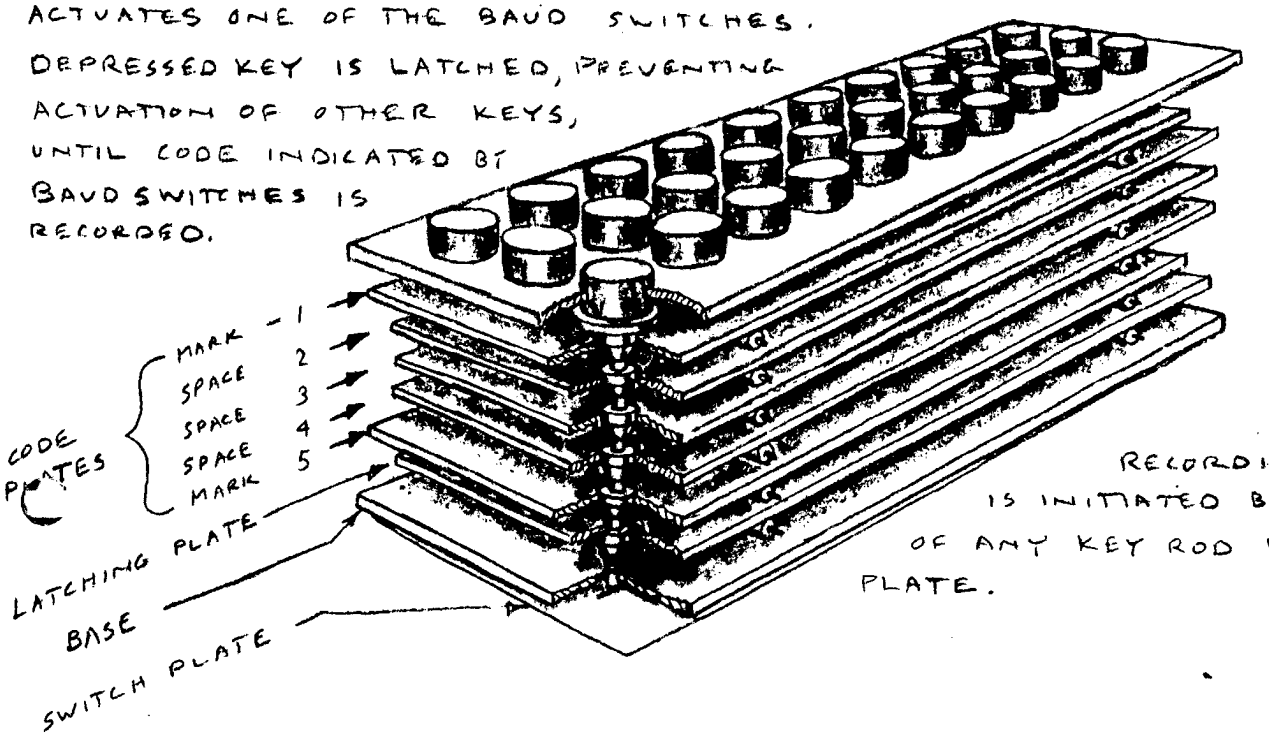
# PROPOSED KEYBOARD

ALL KEY RODS ARE IDENTICAL. THE FIVE CODE PLATES HAVE DIFFERENT HOLE ARRANGEMENTS SUCH THAT EACH KEY, WHEN DEPRESSED, WILL PRODUCE A UNIQUE POSITIONING OF THE CODE PLATES. EACH CODE PLATE ACTUATES ONE OF THE BAUD SWITCHES.

DEPRESSED KEY IS LATCHED, PREVENTING ACTUATION OF OTHER KEYS, UNTIL CODE INDICATED BY BAUD SWITCHES IS RECORDED.




RECORDING FUNCTION IS INITIATED BY CONTACT OF ANY KEY ROD WITH SWITCH PLATE.

# PROPOSED BLOCK LAYOUT OF TELETYPE SIGNAL RECORDER

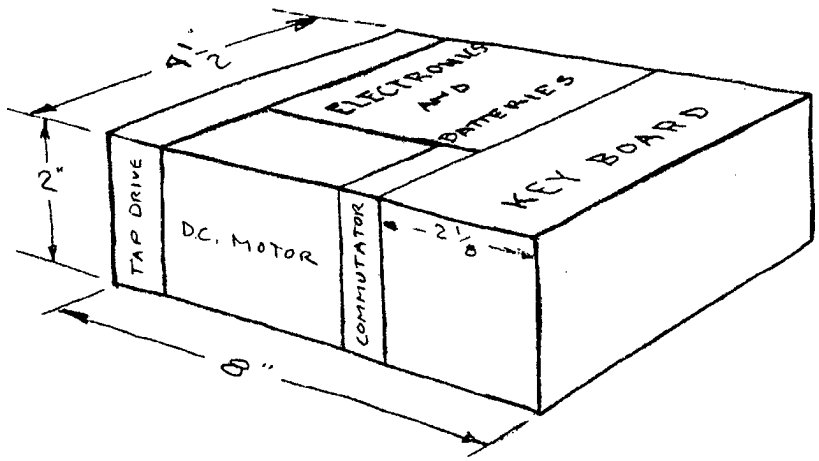



FIGURE 1

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D.E. LIPFERT

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# ESTIMATED COST PROPOSAL

## PORTABLE TYPING DEVICE

PHASE I.

| | |
|---|---|
| Materials | $100.00 |
| Engineering - approx. 400 hours | 1380.00 |
| Overhead - 109.5% | 1511.10 |
| Model-making - approx. 40 hours | 90.00 |
| Overhead - 109.5% | 98.55 |
| Travel | 100.00 |
| | 3279.65 |
| G & A - 10.2% | 334.52 |
| | 3614.17 |
| Profit | 289.13 |
| Total estimated cost | $3903.30 |

Raymond Engineering Laboratory, Inc.

By [redacted]

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